ELECTRICAL REVIEW

[ILLUSTRATED.]

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The Sun Electric Company's System and Appliances.

Probably no one system of electric lighting is receiving more attention from those already engaged in the business than the one manufactured by the Sun Electric Company, of Woburn, Mass., under the inventive guidance of that ingenious electrician, Mr. M. M. M Slattery. Their latest development is the induction system, which is especially adapted for central station incandescent systems, in cases where the lights required are beyond the usual limits of low tension supply, say one-half mile from the central station. The claim is made for the Sun induction system that it is as flexible and economical in use of energy as the low-tension systems, yet can supply light at much greater distances from the central station, and that with a small expense for conductors. The system is simple, and described as follows:

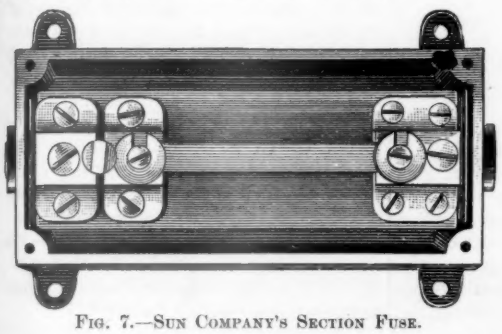

FIG. 7.—SUN COMPANY'S SECTION FUSE.

An alternate current dynamo machine at a central station supplies the circuit with a high-tension alternating current of constant pressure, the quantity of current varying with the demands on the circuit. At or near the various points of consumption are disposed, in multiple arc between the main leads, the converters or transformers, by means of which the high-tension currents of small quantity induce in the secondary circuits, in which are included the lamps, currents of lower pressure but greater quantity. These secondary circuits containing the lamps can be run just as for multiple arc low-tension circuits, which, in fact, they are, and are consequently safe. The system is self-regulating, and lamps can be turned on and off, just as in low-tension circuits, without affecting others. At the central station a small dynamo is provided for exciting the field magnets of the main machine. Pressure and current indicators, also, at the central station, inform the attendant of the condition of the circuit, so that he can, by simply turning the handle of a resistance box, regulate the current supplied. The company has several of these plants in operation, and all give satisfaction, notably the one at Bridgeport, Conn.

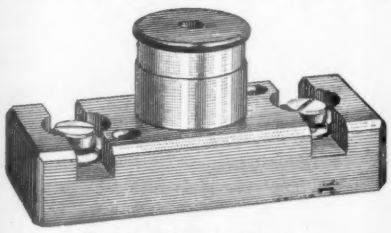

FIG. 8.—CEILING BLOCK.

The cut No. 12 shows the central station apparatus, the horizontal finger on the dial indicating the current in the circuit, and the vertical one the pressure. The switches at the lower portion of the apparatus are for adding to or removing from circuit additional machines as required.

Cut No. 2 shows the exterior of one of the converters. The company does not now, except in special cases, recommend their multiple series system with distributors or protecting boxes as a system, considering the induction system preferable as a rule. There are, however, frequently cases where the use of distributing or protecting boxes is distinctly desirable. For example, where an arc light circuit is already in operation and along its line there is a demand for incandescent lamps, remunerative contracts for incandescent lighting can often be closed while it might not pay to start a separate system.

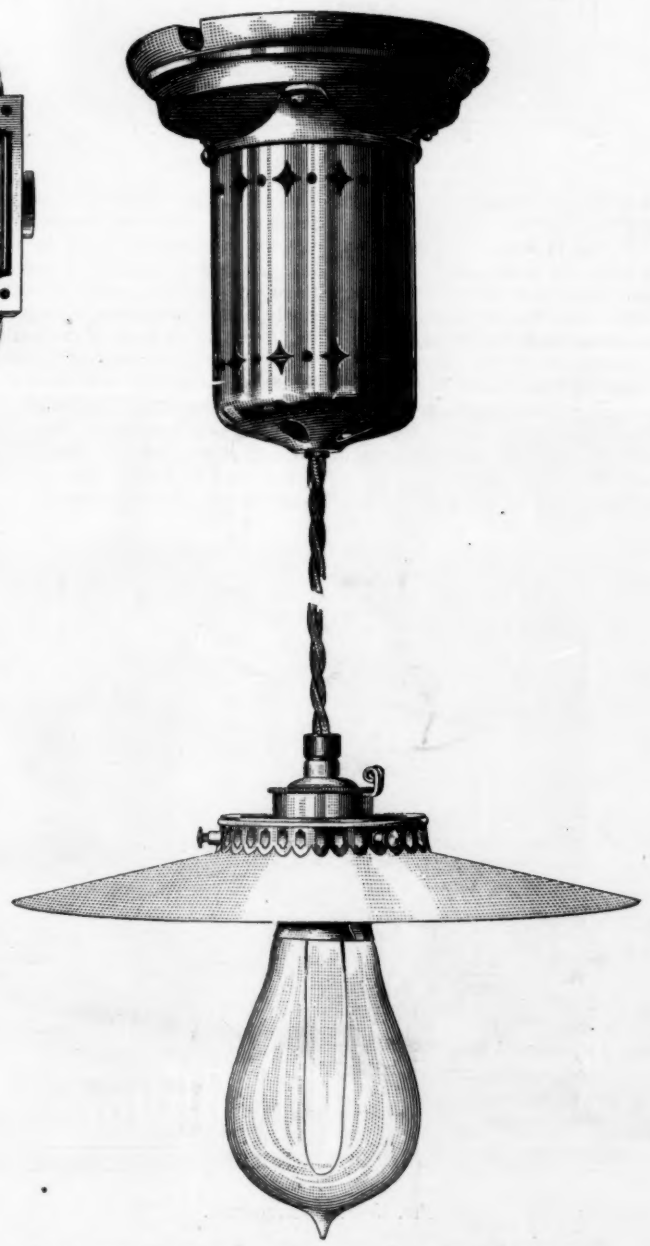

FIG. 1.—THE SUN COMPANY'S 16-CANDLE MULTIPLE SERIES LAMP.

Fig. 3 represents one of these distributors arranged to protect eighteen lamps, and to run on a 10 ampere circuit. One form of the multiple series system, found to meet with a good deal of favor from arc light companies, is the method of operating large incandescent lamps, three of which can be interposed in multiple on a 10 ampere arc line, the current dividing equally between the three. In such cases they do not employ a separate protector, but prefer to enclose the substitute resistance (operating as a means of preserving the circuit) within a compact and ornamental polished brass case above each lamp. These sets of lamps are of two sizes, the "Regina," giving 120 candle power each, cut No. 4, and the "Princess," one-half that. The two equipments are similar in appearance, only differing in the size of the lamps. A second form of this arrangement suitable for low-studded rooms is shown in Fig. 5, drawn to a larger scale.

On a still larger scale is shown in Fig. 1 the Sun Company's usual style of 16 candle power lamp (about one-half actual size) with holder and porcelain shade. The upper portion of this cut shows a device by means of which lamps in groups may be operated with safety on constant current or arc light circuits—each lamp being supplied with one of these individual cut-outs, in case of failure of a lamp, the resistance in the brass case is automatically switched into circuit, thus taking up the current of the defective lamp. This obviates the necessity for a distributing box, and is similar in principle to the method of operating the Reginas.

FIG. 9.—SWITCH.

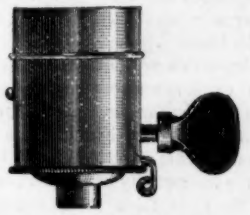

FIG. 10.—KEY SOCKET.

Fig. 7 shows what is called a section fuse for the main primary circuit These are interposed at different points in the circuit so that an accidental short circuit in one section will only affect that section without affecting other portions of the circuit.

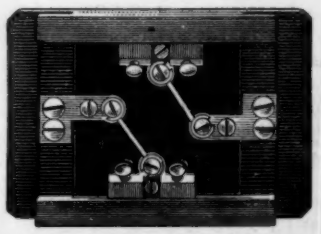

FIG. 11.—INTERIOR OF DOUBLE POLE FUSE.

Fig. 8 represents ceiling block and fusible plug for low tension circuits; and a switch to turn on or off different multiple circuits is shown in Fig. 9.

Their key socket or switch for incandescent lamps is represented in Fig. 10, and Fig. 11 shows the interior of a double-pole fusible for sub-circuits.

The lamps of the Sun Company have obtained an enviable reputation for life, and that their economy is good is apparent from the fact that on their induction system they give 10 lamps of 16 candle power to the horse power.

On Electro-Pulsimantia — A Method of Detecting the Guilt of Crime by the Electro-Sphygmometer.

By G. P. Hachenberg, M.D., Austin, Texas.

An extraordinary invention at first may strike some with wonder, and the multitude with doubt and misgivings. This was forcibly demonstrated in the introduction of all great inventions, and in particular those in the line of electricity.

The inquiry rises, What mental process will produce what we might call a revolutionary invention? It is evidently in the comprehension and masterly application of those broad principles in physics that hold in intimate relations the different forces in nature. For our special purpose, let us make an illustration: Take the hardest substance in nature, and follow other bodies that in regular gradation become less so—thus pass through the solids, fluids, gases, until it brings us into the mysterious domains of electricity, life, mind; yea, the soul itself! we will find in the borders of any of the immediate two, betraying a mutual accommodation. As each element in nature retains its individuality, this accommodation is incidental. In the organic world it is mainly physiological; in the inorganic, chemical; in the gases, by mutual absorption; in electricity, by permeability. In the still higher scale we have the wonderful and mysterious effects of a complex combination of mind and matter. Yet this accommodation is not always as simple and uniform as here represented, for often in the execution of chemical affinity, or in the propaga ion of life, several collateral forces are required to bring about a single legitimate effect.

It was a recognition of this accommodation between sound and electricity that led to the discovery of the telephone and other electrical inventions. On the other hand, to trace the accommodation between electricity and the essence of life and the mind, vast and important is the field to the scientist and the inventor. That this relation of electro-biology does exist is apparent, for withdraw electricity from the citadel of life and you take away an equivalent that would destroy at once its identity.

I will leave this part of the subject with an explanation of what might be considered by the theologian a presumption on my part to include the soul in my materialistic classification. I believe in the immortality of the soul, but I have the same faith in electricity. The fact is, electricity is the border line between the material and immaterial world; it is neither one nor the other, yet everything to both. The classification here referred to is interminable until lost beyond all conception.

* * * * *

In the May number of the Cincinnati *Medical News* appeared a paper from the writer "On Mental Emotions Solved by Pulsimentia." The ultimatum of that paper was to show by what method the guilt of crime in our criminal courts could be revealed by the sphygmograph. I was led to assume this extraordinary position, not only from my own experience, but from many authenticated points in physiology and psychology that may be applied to establish the fact. I will not go over the same grounds I did then, but keep within the line of the specialty of your paper.

It is universally admitted that the action of the heart is influenced by mental operations. A most important feature of this cardiac disturbance is that it is perfectly independent of the will, and is so entirely beyond its jurisdiction no force of the mind can prevent it. The character of cardiac action is often complex and varied. In health the heart has its special action in rest, sleep, labor, sitting or standing, running or walking, in fasting or feasting, etc. In sickness alone, according to Dunglison's Dictionary, fifty different kinds of pulsations are enumerated. The Chinese physicians exceed all others in the study of the pulse, who apply their knowledge of six hundred different pulsations, it is said, with such success in their prognosis and diagnosis as to excite the great wonder of their confraternity in more civilized nations. We confess no great appreciation of this extravagant enumeration of pulsations, still it carries a suggestion of great importance in our question.

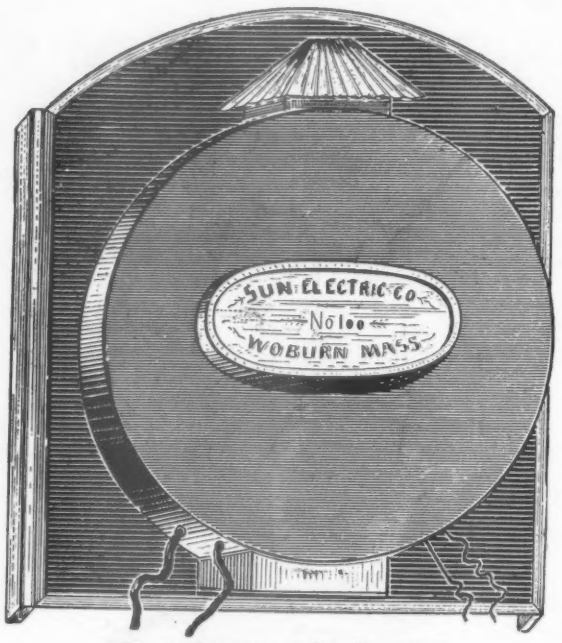

Fig. 2.—Interior of Sun Converter.

The heart is the dynamo of the living body, and with electric speed and accuracy is self-adjusting to meet every mental and physical operation in man, either in health or disease. This can be verified in a measure by the sense of an educated touch, but is a question of no doubt under any circumstances by the use of the sphygmometer. But to leave this intricate part of the subject, and to avoid details, we will refer to but three principal effects of undue pulsations caused by mental influences that must be apparent to every one.

1. There is an undue action of the heart without ostensibly involving the capillary circulation. This we find in subjects that possess great presence of mind.

2. An undue action with capillary excitement, as manifested by the "blush of shame."

3. An undue action with contractile influences on the capillary vessels, causing the pale look of terror on the face.

These are the three distinct cardiac disturbances out of its natural pulse curve that betray mental emotion. We find in each physical peculiarities, and each with successive changes that only the tracing of the sphygmograph can reveal.

There is a special interest involved in the first proposition, and that is the role the will exercises over the capillaries, but fail to have little or no effect to control the action of the heart itself.

In solving the character of mental emotions we attach the greatest importance to the hieroglyphic tracing of the sphygmograph. This remarkable instrument at present is pretty much what the temporary magnet was before Morse utilized it for telegraphing. He had in it but a very limited action to go upon, yet by an arrangement of that single uniform movement, messages are now sent to nearly all parts of the world. The pulse, with its innumerable little curves, the result of mental influences, through a combination of surrounding circumstances, can be intelligently interpreted. The analogy of the magnet may not be a very good one, yet it is neither a very bad one when we take into consideration how successfully the physician can telegraph on the heart of his patient, the patient not having a will of his own in the experiment.

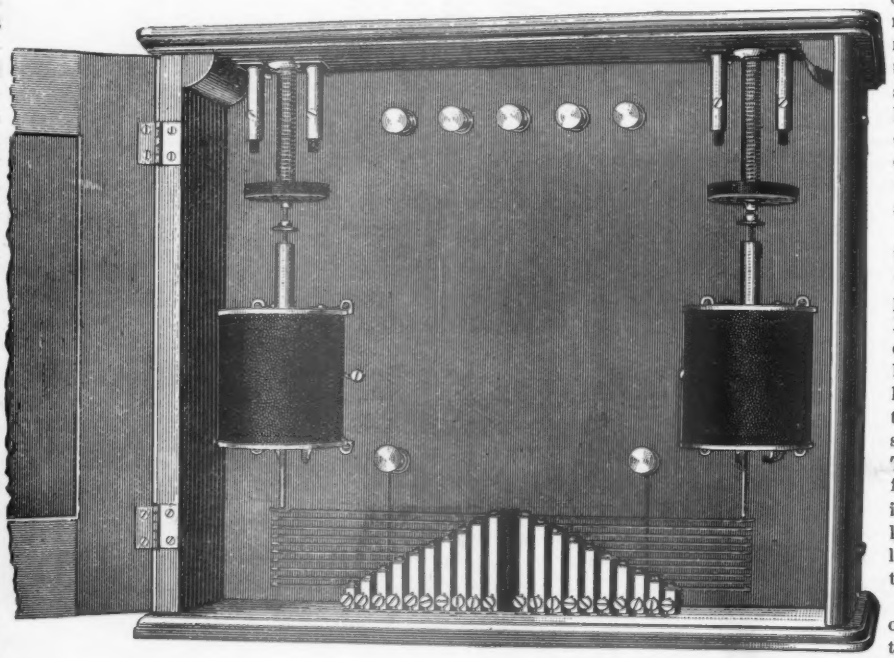

Fig. 3.—Sun Distributor.

The eminent Spencer gives us a key to this. "He regards the heart as the seat of emotional feelings, considered as a mental state, apart from the movements to which it gives rise." The learned Unzer says: "An irregular influence of the vital spirits on the nerves of the heart render its movements at one time excessive, and another enfeebles them." Vauvenargues expresses the strange idea that "great thoughts come from the heart." The distinguished medical jurist, Tuke, says: "Instinct is innate in the breast—it emanates from within the internal organs of life, it acts without the concurrence of the brain." Prof. Rauch, the psychologist, says: "Every emotion of the heart has a tone to express it."

* * * * *

From my experience with malingerers in the United States army, I am fully confident that the sphygmometer can be made to take the first and highest place in medical jurisprudence. In court, no cross examination, no conflicting evidence could impair the value of a testimony established by a careful medical jurist, or rather a professional pulsilogist. But to introduce pulsimantia to promote justice, and to employ it as a most powerful means to detect crime, we may at times have to overcome many difficulties to bring it to a satisfactory issue. These may be successfully met by experience, tact, and, in particu'ar, taking into consideration all the incidental circumstances of the case. To bring the sphygmic art into our courts of justice is to introduce an infant, but with capacities and indications of arriving at full stature. Nervous irritability on the part of the culprit may be the greatest obstacle in the way. Where we have to do with such a case, the subject has to be calmed down by a bland and easy examination by the prosecuting attorney or the pulsilogist himself. Special care must be taken in this part of the examination not to give the subject the least chance to commit himself, or to swerve from the path of truth. This preliminary step should hardly be called an examination, but simply a conversation, which should be on a subject foreign to the charge against him. When a perfect calmness of the mind is thus secured, suddenly and unexpectedly a startling question in regard to the crime is propounded. The heart will promptly respond under the charge, its normality is impaired, and, with a guilty conscience, will continue so, under the pressure of a severe and skillful examination. With the innocent, if a cardiac shock does occur, it is soon repaired by a normal reaction. It must have been by some such a process Dr. Rush discriminated feigned from real insanity, by the relative rapidity of the pulse. Here, with the insane, a normal pulse may technically be admitted as a characte istic pulsation of the insane; with the malingerer it is abnormal, as his individual pulse is lost under the pressure of a criminal emotion. This point should be well understood by the medical jurist, which would be confounded by the pathologist as a gross incongruity.

In the examination of an accused for a crime, the subject should remain in an easy sitting position, with his pulse under a continuous observation. Let us assume that he is guilty of the crime he is charged wi h; it matters little what his nonchalance would be, he would have no volition to control the emotions of his heart; that, by skillful management, would betray him. The tongue, under his will, may be false; but the heart, not being under its bondage, is ever true to itself, and knows no deception. It is only to learn its language, which bears no other tale than the man's own conscience.

It is impossible, within the limits of our paper, to go into any detail of this intricate subject, which involves almost every science in medicine and metaphysics. It is like the treatment of the sick; each case must have its own special treatment. I would here state that, where a single test throws some doubt on the case, it is well to repeat the experiment on a different basis, with such culminating questions suddenly propounded not given before.

If these experiments are repeated several times, at different periods, with like results, we can take the test as a conclusive testimony. The philosophy is this: A sensory impression registered in the cerebral hemispheres in the perpetration of a crime, will,

in spite of the will, expend its emotions on the heart (for every deliberate crime is an emotional event), the effect of which may in a measure be reproduced at any subsequent time, by exciting a sudden, unexpected attention to the same in particular when tempered with fear and anxiety.

Perhaps in no case can the pulsilogist render more important service to justice, than in the examination of important witnesses. In such cases, let the witnesses make their statements with the pulse under observation, and when this is skillfully executed, there is no doubt that the perjury can be detected. In such cases as we have to deal with primary emotions, the experiment proves easy, and with positive results.

If the action of the heart can be made to prove the guilt of the criminal, it will with the same potency serve to establish the innocency of the accused. On what physiological principle, we have already stated. In the examination of the innocent, there may be palpitation, as in the guilty; but, as Tuke says: "When, however, we speak of the same result being produced by opposite emotions, we find on closer examination that this sameness applies to the frequency of the pulsations rather than to their character; that the palpitation of joy is of the nature of increased vital action, that of terror is simple irritation, and no sign of power."

"We are all conscious of the
Sensations sweet,
Felt in the blood, and felt along the heart"

of the honest and innocent man. We may even go to the extraordinary depth of our subject to suspect a peculiar fixed pulsation of the heart of those old in crime, characterized by irregularity and irritability. Their emotional life would lead them into that condition. Speaking of intermittent pulse, Dr. Richardson observed: "I have never met with a case in which the disorder was not sequential to some anxiety, shock, fear, sorrow, or their similars."

But there is such a thing as a man committing a great crime where the sphygmoscopy will fail to render any positive proof of the same. This is the case with irresponsible criminals—those who are insane. As the original impression of the crime committed was not made on the mind, as stated above, it cannot subsequently become an emotion of the heart. Still we attach great importance in applying the sphygmic art in these cases, if only to render a differential diagnosis.

The sphygmometer now in use, by the medical profession, gives us satisfactory results for ordinary practical purposes. But its operation does not come up to a full requirement in the study of psychological pulsations. The present instrument may give a fair register of the pulse curve; but to represent that curve in all its details, the operation can only be effected by the dynamic aid of electricity. We have no space here to go into details of the electro-sphygmometer, but will point out its special functions. It is to modify and increase the motor power of the instrument. The registering is likewise an electrical process, and is given in larger figures than by any other method. It is to be remembered that the point of each pulse curve, both large and small, in the same line, may require a special investigation, and where they run into each other in case of great cardiac embarrassment, they can only be isolated by an electrical contrivance. I would respectfully invite attention from electrical inventors to this instrument. There are several good plans for getting up the electro-sphygmograph.

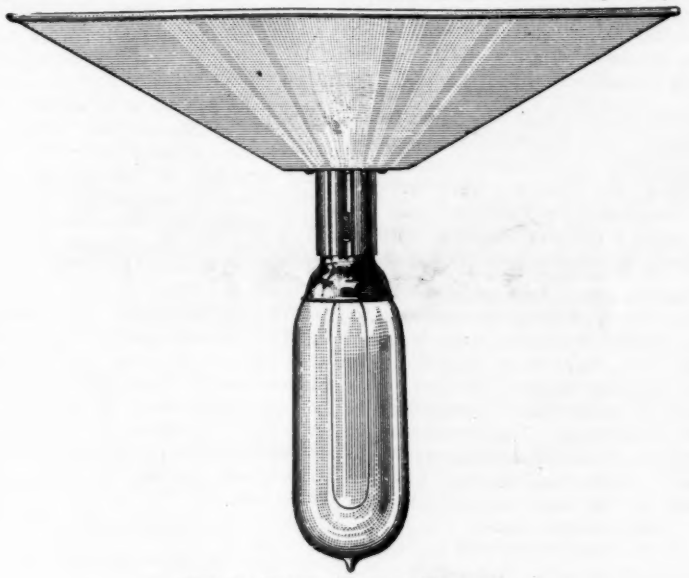

FIG. 5.—SECOND FORM OF FIGURE 4.

I claim to be the first to resort to pulsimantia to detect the guilt of crime, yet it is an art that has been in a crude manner in practice for thousands of years. There is not a day but some shrewd detective is led to detect the guilt of crime by mental emotions betrayed by the criminal. If these have a legitimate bearing in some cases in so crude a manner, why may not science furnish us means to make them infallible in all cases?

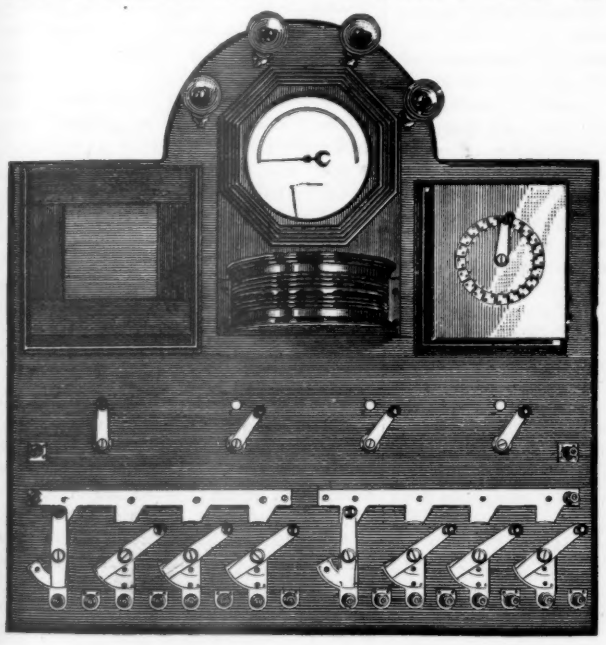

FIG. 12.—SUN COMPANY CENTRAL STATION INDICATOR.

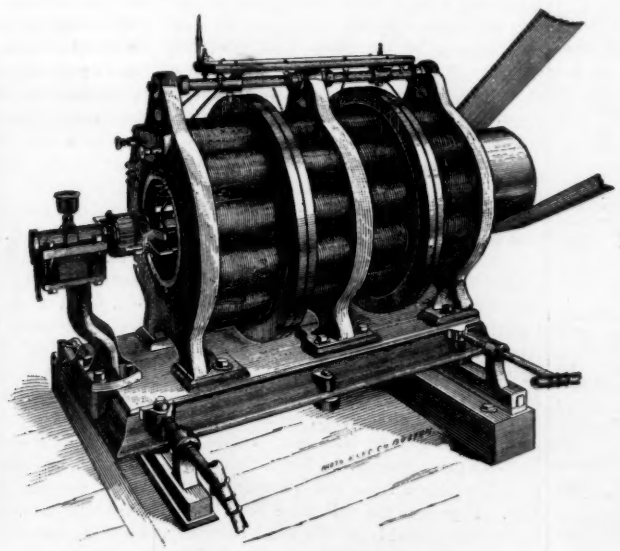

FIG. 16.—SUN COMPANY'S DYNAMO.

FIG. 4.—THE "REGINA" LAMP.

Important Patent Decision.

Judge Acheson has filed an opinion in the United States Circuit Court, Pittsburgh, in the case of Emerson, Smith & Co. *vs.* Ernst T. Lippert, on a plea to the bill of complaint.

The defendant, in his plea, denies the complainants' right to maintain their suit in equity against him, because a patent for the same invention had been granted in Great Britain prior to the granting of the patent in the United States upon which suit is brought, and that the act of Congress under which the patent in suit was granted provides that no patent shall be declared invalid by reason of its having been first patented in a foreign country, provided the patent shall expire at the same time with the foreign patent, or, if patented in more than one foreign country, it shall expire with the one having the shortest term.

James E. Emerson, one of the complainants, made application in the United States for a patent for an improvement in saws, on May 31, 1871, and upon this application a patent, dated February 6, 1872, for the term of seventeen years, was granted to him. On October 12, 1871, Joseph E Holmes, as agent for Emerson, made application in England for a patent for the same invention, and filed in the office of the Commissioner of Patents of Great Britain a provisional specification, and a patent was granted to Holmes, sealed April 3, 1872, and dated October 13, 1871. The complete specification was filed April 12, 1872, the same having been subscribed by the patentee on March 22, 1872.

The act regulating the granting of English patents provides that the applicant for a patent may file with his petition, either a provisional specification—simply describing the nature of the invention—or a complete specification. If a complete specification is filed, the invention is protected for a term of six months, and the applicant is clothed with like powers and privileges as if the patent had been issued. But where a provisional specification is filed, it is to be referred to the law officer, who, if satisfied, will give a certificate of allowance to be filed with the Commissioner of Patents, whereupon, for a period of six months, provisional protection is secured; and within six months after application, upon the warrant of the law officer, a patent is to be granted, and may be sealed and bear date as of the day of the actual sealing or any other day of application or date of sealing, provided a complete specification has been filed; but no proceedings at law or equity shall be had for infringement committed before the same was actually granted.

The question before the court was whether, before the granting of the United States patent, the invention had been patented in Great Britain, within the meaning of the 25th section of the Act of Congress of 1870.

The court holds that the invention had not been patented in Great Britain before it had in the United States. The filing of the provisional specification merely secured temporary provisional protection, within the narrow limits of saving any patent to be thereafter granted from prejudice by reason of the intermediate use and publication of the invention. That before the sealing of the English patent Holmes was not invested with any of the rights or privileges of a patentee. Nor is it of any moment that the English patent was dated as of October 12, 1871. That date was an arbitrary one, and gave to the instrument no retrospective operation; and the life of the United States patent, issued before the sealing of the foreign patent, is not to be abridged by the antedating of the latter. The plea is therefore overruled.

The Khotinsky Glow Lamp.

This lamp, which is manufactured under a secret process, is gaining its full share of favor on the Continent, the patent of which, it is reported, has become void in Germany, owing to the Canadian and Italian patents having fallen through. The German Navy has now, after exhaustive tests, adopted this lamp in preference to all others. The factory at Rotterdam is only able to deliver 300 of the daily demand of 1,000 lamps, and as the cost of extending the premises is too high, and the import of the manufactures into Germany is burdened with heavy dues and freight charges, it has been resolved to establish a second lamp factory in Gelnhausen (on the Berlin and Frankfort line), for which 200,000 marks have already been subscribed.

—— It is reported from Portland, Me., that a new electric light company has been started there, with some of the leading stockholders of the gas company as backers.

The Telegraph Blunder.

It is no strange thing that the telegraph folks should make such an error as the one made in the dispatch to the detectives asking them to look out for the "Bla le," instead of the "Blake," the reason being that they do not put skilled talent in small offices, and the boy or girl who gets $25 or $30 a month cannot be expected to do correct work. The letter "k" was the "sticker" for the poor "plug," as they call a raw operator. The Morse characters for the letter "k" are —.—, and for "d" are—.., the last part of one being a dash, and in the other a dot. Now the sender of the message ought to receive as much censure as this poor plug operator. Why in the world did he not give the full name of the Blake? If he had, every one acquainted with lake craft would have known which boat was meant. Then why were detectives not sent to guard Skillagalee and Waugoschance? The channel at either of those points is not a mile wide, and it would have been utterly impossible for the Blake to pass vigilant watchers stationed there. The fact is, the whole thing was a bungle from start to finish.

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NEW YORK, SEPTEMBER 10, 1887.

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When the street car horse resigns in favor of the electric motor, will he be *hors du combat*, or will the sausage maker come to the rescue?

Steam heating and electric lighting of their trains is receiving very close attention from a number of the leading railway managers of the country. On some roads the change has been decided upon, and cars are being reconstructed on the new plans as rapidly as possible.

"Induction Telegraphy to and from Bodies in Motion" is the topic for the meeting of the Electric Club next Thursday evening, August 15th. Mr. Chas. A. Cheever will present a paper on this new and interesting subject, which is just now attracting much attention in railroad as well as electrical circles.

The photographs taken on the grounds, of the guests of the American Electrical Works' clam-bake, which was held August 12th, have been received. Each photograph has the names of those present printed on it, and so located that all can be easily distinguished. The photographs are very good, and there is a general air of good nature on the countenances of all; in some it appears in the shape of a broad smile. There were 161 attendants.

At Newburgh, N. Y., a certain police officer a few evenings since found a private electric lamp out at an early hour, and determined it should continue to shed its blaze over the sidewalk. At the bottom of the lamp was a little spring which Mr. Officer touched with his finger. The electric current was on, and the moment he touched the spring there was an electrified policeman. He won't attempt to light electric lamps any more. At least he says he won't.

The American Institute Fair of this city begins this month. The electrical exhibition is to be on a larger scale than heretofore, and will be managed by the branch of the Institute known as the New York Electrical Society. There are promised a number of electrical novelties, and while we are not informed that any of the established electrical companies have decided to exhibit, there will no doubt be enough variety in a local way, in the electrical department, to make it one of the several attractive features of the Annual Fair of the American Institute.

General Manager John B. Powell, of the Brush-Swan Electric Light Company, we are surprised to learn, resigned on the 31st of August, and has brought suit for $1,000,000 against the Brush Electric Company and the Brush Swan Company of New England for non fulfillment of contract, made in 1883, to furnish him storage batteries. Under Mr. Powell's management the Brush-Swan Company has done a large and prosperous business. Papers in the suit have been served on President Stockly, of the Brush Company, and President Strong, of the Brush-Swan Company.

The German-American Technical Society of the United States, which is made up of mechanical engineers, civil engineers, architects, and chemists, met in annual convention at 194 Third avenue last week to listen to papers on the progress of inventions. Papers were read on "The Heating and Lighting of Railway Cars," by Paul Goepel; "A System for the Purification of City Sewers," by C. H. Schneider, and "The Overhead System of Carrying Electric Light Wires in Cables," by M. G. Schinke, of St. Louis. There was a banquet at the Leiderkranz Hall one night, at which were toasts and speeches.

IT IS COMING, NEVER FEAR.

In response to an article in the *Sun* on the recent action of lightning upon the Field electric motor, our esteemed contemporary, the ELECTRICAL REVIEW, assures us that "there is no difficulty about preserving all parts of an electric railway system from damage by lightning." If that is so, why bring on your motor.—*N. Y. Sun.*

AN IMPORTANT ELECTRIC LIGHT PATENT.

A good deal of interest is manifested as to patent No. 369,280, issued Aug. 30, 1887, to Mr. Edison, which is in the nature of a surprise to the electric light fraternity. It is illustrated and described on page 9. If the patent is what it seems to be on its face, it would appear as if the entire field of multiple distribution from central stations were now in the hands of the owners of this patent. It has been a long time getting through the entanglements of the Patent Office, having been filed Feb. 5, 1880. The patent is about as broad as a patent can be, being regardless of specific devices and laying a powerful grasp on the fundamental idea of multiple distribution from a number of generators through a metallic circuit.

There will doubtless be a bitter contest in the courts one of these days, with this patent as the bone of contention. We know nothing of the possible merits of such a contest, from any point of view, and it is not our business to go into such a matter, but it does look seriously like war. It certainly is food for reflection by those interested in general distribution of electrical energy from central stations, and this class is growing larger almost daily.

MAGNETIC MARVELS.

A gentleman who is the owner of a young setter dog is bringing him up in the way that a dog should go, according to the ethics of Solomon; nay, more, he has spoiled the rod, in fact, several rods, while his puppyship evidently thought that he was sharing the fate of the flagellant. He is also a skilled amateur machinist, and during leisure evenings employed his time in making an unique collar of polished iron plates, elaborately fashioned, and then nickel plated.

One of the methods of instruction consisted in guiding the dog in the elementary stages of certain evolutions by inserting the point of a whip under the dog's collar, and by the slight pressure exerted one way or the other teach him the desired movement; in this manner the motions of the dog became responsive to a slight pressure on the neck, such as is often seen in cavalry horses and other saddle horses, except those in the eastern part of the country, where they still retain the old method of guiding saddle horses by the bit.

The other evening our friend entered an electric lighting station, accompanied by the dog, when it was noticed that the dog was moving sidewise towards a dynamo, and at the same time exhibiting symptoms of the most abject fear, and his master, divining the cause, pulled the dog away just as he was almost in juxtaposition to the revolving armature of a Brush dynamo. The dog had been true to his training, and obeyed the slight pressure on his neck caused by the attraction which the field magnets exerted upon his collar.

A mishap illustrating human stupidity in the same manner that this showed brute intelligence occurred in this same station a few evenings earlier. The manager of this company is extremely strenuous on the point of keeping the station in perfect order; in fact, he is reputed to be "poison particular." On this evening he was showing some visitors over the station, when a new man, while passing the other side of a dynamo, with a dust-pan full of sweepings, suddenly, with a dexterous turn of the wrist, threw the contents over the party; and as the honest German laborer threw up his hands in astonishment, the magnetic attraction completed its work, drawing the dust-pan completely out of his hands; and it became transfixed to the field magnets.

And this is the reason why this station is equipped with brass dust-pans, and the advice is passed along to all electric light stations.

But this article, like most affairs mundane, must lead either to the table or the church. And it shall be the former; for a correspondent at St. Paul sends us an account of the woes of a laborer passing the dynamo with a dinner pail, seeking a cool place for a dinner, when the magnetic attraction suddenly twisted the bottom of the pail, and upturned the whole contents upon the floor, beyond recovery.

OUR CHICAGO LETTER.

(From a special correspondent of the ELECTRICAL REVIEW.)

The next sensation here will be the Exposition, with its band and its promenading processions, its brick machines and its electric lights. It gets around once a year, and the people like it. This year part of the lights are to be placed by the Western Electric Company, and the Arc Light and Power Company will also have some of the illuminating to do.

The new Phœnix Insurance Building has just been lighted up by the Edison Company. The contract called for 12½ per cent. addition to the rated capacity of the dynamos on the trial exhibit. So, on the 31st instant, at 1 o'clock, P. M., Mr. Sargent, of the Edison, made a remark which sounded like "Letter go, Gallagher," and round went the wheels.

The trial was with three 400 light machines, each of which fed 450 lamps, or a total of 1,350 16 candle power lamps for ten consecutive hours. In addition to the story the ammeter told, the lights were tallied by actual count. There will be about as many more placed, but the law of average, it is believed, will not require any more dynamo power at present, at least, to run all the lamps that will be lighted at any one time.

The Western Electric Company have just inaugurated the lighting of Marshal Field & Co.'s wholesale store, which covers the square bounded by Quincy and Adams, Fifth avenue, and Franklin, with 155 arc lights, and the Edison people have an office plant of 500 incandescents in the same establishment.

Parties here are about to inaugurate a series of experiments relative to the matter of extra-currents, self-induction, primary and secondary induction, etc., to see how far it is possible to widen out the latitude between scientists. When one gentleman says that under some circumstances 100 to 200 volts of direct current will kill, and another maintains that 1,000 volts of what a dynamo man once called the "rig-a gig-a-rig-a-gig style of juice," was enjoyed by an individual for four consecutive minutes and hasn't missed a meal or a treat since, why its like the case of the starch factory which the alderman wanted shut up, who remarked in regular meeting that "that 'ere starch factory was a —— —— —— stinkin' hole, and it was time the council was a stickin' its nose into it!" The investigator in this case says: "If a single jar of Bunsen, with an induction coil, will make a ten year old boy dance all over a sidewalk and paint the atmosphere with excerpts from the book of Revelations, he can't for the life of him see why some hundreds of times that number of volts shouldn't hurt more 'n it evidently does, 'cordin' to evidence. And when a feller can knock himself down with a dynamo field magnet by letting himself into a circuit in company with it and a half dozen jars of battery, when another feller can take the full current of a sixty-five light Brush arc machine, and say it's wholesome, and he likes it, he can't exactly see where the eternal fitness comes in."

He says he's in the condition of the good little Sunday-school boy, who belonged to the Band of Hope, and expected to sometime or other be made president of a temperance club. He had been led to believe that cider was a terrible thing to make drunk come, when a very red-faced man one day, encouragingly patting his head, said to him: "That's right, sonny, avoid cider as you would any evil thing; it's the devil's drink. Don't touch it—drink whiskey!"

The Van Depoele Electric Company are asking to show practically the working of their railway system in Lake View, just north of Chicago. The telephone people there are fighting the franchise. All that is ancient upon this subject has been resurrected and dressed anew. Another element is also said to be working against them. On the line of the proposed railway is a road house—one of that kind of refreshment places, where it is hard to pick an old-fashioned five-cent piece up from the bar,

you have to kind o' slide it off, you know, on account of the moisture and the thinness of the coin. Should the railway be established, it is probable the road house will not be anything more than a flag station on the Sunday time table; and that's why. The electric railway people are all the more anxious, as the West Division railway people are getting crowded and want additional facilities, and, while they say they want to see a practical demonstration, they will not go to Montgomery, or Scranton, or any other place, to see it. It must come to them.

The American Bell Telephone Company seems to be inaugurating a war of races against the Cushman. La Porte and Michigan City are two new battle fields, the defendants in these places being individuals who are using the Cushman. The suits are on account of patent infringement.

The Lake View Electric Light Company, whose affairs have been before the public sometime through a suit in which Wm. Vogel, secretary, was charged with embezzlement of the company's books and papers, has had the case dismissed, but continues litigation for the recovery of the books. Their young electrician who skipped with a female partner, of whom mention was made in these columns a few weeks ago, married the lady, was arrested for larceny, brought back, examined and discharged. The froth has now been blown away from the matrimonial mug, and the young pair will toddle along the road of life as other people usually do.

Early one Monday morning a week or so ago, a solitary horse might be seen drawing a light wagon through some of the principal streets at an early hour. There was little of extraordinary about its appearance, but its curious movements attracted the attention of early loungers. With the wagon were men with burglarious looking tools hanging from leathern belts, and anon these disappeared mysteriously down alleys or cellar ways, into courts and up fire escapes, to return anon with huge coils and little coils of No. 18 B. & S. copper, paraffine covered, naked, hard drawn, galvanized No. 12 or 14 iron—well, all the varieties you could look for and hope to find where there are wires. These came from the roofs, from their resting place on the cornices. From garret and hall they shot athwart, or down, or up, across the alleys and the streets; but they all came down, and—disappeared. And the sad and solemn undertaker who drove that wagon in the early morning, sang, or if he didn't, it was his own fault, for nobody was holding him:

I sing the death of the bucket shops,
Which string their lines from the giddy tops
Of the buildings high, or whose wires are found
In the darkness deep of the underground.
For the bucket fiend has no rights above—
No claims on the pity, the mercy, or love
Of the board of traders, the world around;
And he never can rest in the underground.

And around the doors of the once happy bucket shop man there lingered long on that eventful morning a cerulean fog or halo, tip-tinted with red, while in the middle ground of the picture an oath manufacturer, livid with rage, and bowed with consternation, metaphorically wept for the days (and the wires) that are gone. "The Chicago bucket shop, it is assumed, shall be no more forever," is what they say; but whoever heard of rooting out Canada thistles by cutting them down just once? We shall see.

CHICAGO, Sept. 5, 1887.

Electric Traction at Philadelphia.

Mr. Reckenzaun (upon whom, by the way, our American cousins have bestowed the distinguished title of "Professor") has recently been assisting at some trial runs of an electric tramcar in Philadelphia. Storage cells are used to supply current to a Sprague motor, and very successful results have been attained. It is unnecessary to add that Mr. Reckenzaun's long-continued study and extensive practical experience in all matters appertaining to electric traction and the working of secondary batteries should render his services of the greatest value to the American electricians, who are only just commencing to launch out in this particular direction—*London Electrician.*

The Electric Heater on Street Cars.

To the Editor of Electrical Review:

The electric railway of the Richmond Union Passenger Company is rapidly nearing completion. Under the present grants from the City Council the road will be over eleven miles in length, and, should other grants of the right of way through other streets be made, its entire length would be over fourteen miles.

This company will use the Sprague motor—two of 7½ horse power each to a car—and have concluded, for the present, to adopt the overhead wire system. There will be fifty cars sixteen feet in length, and the current will be supplied from a plant thoroughly equipped for its work. Power will be supplied from three steel boilers of 120 horse power each, set with the Jarvis patent furnaces, and three engines of the Armington & Sims make. Each engine will drive two Edison dynamos, and underground conduits will be laid to conduct the current to the poles.

It is on the cars of this company that a practical test will be made of the electric heaters of Dr. W. Leigh Burton, a description of which was published in the ELECTRICAL REVIEW of July 2d last. These have already been constructed, and as soon as the current can be supplied a preliminary test will be made. These heaters are 27 inches long, 8 inches wide and 1 inch thick, the casings consisting of cast-iron, resting on legs 4 inches from the car floor. They will be placed under the seats, three on a side, and will have a radiating surface of 21 square feet. Connected in series, and forming a part of the circuit to the motor, these heaters will have a resistance of about 5½ ohms, and by means of a switch can be cut in or out of the circuit at the will of the operator.

Richmond, therefore, will be the first city to attempt to solve the problem of running, lighting and heating cars by electricity; and should the latter prove to be successful, it will be an additional incentive to the construction of electric railways in northern latitudes. DYNAMO.

Richmond, Va., Sept. 3d, 1887.

Engineering Training at Vanderbilt University.

Perhaps no other indication of a healthful development in the South is more reliable than that southern educational systems are making rapid strides, and are yielding encouraging results both quantitatively and qualitatively.

Not only is this true of academic culture, but in industrial education this hitherto agricultural section is laying the safest foundation for her industrial development by providing her own technical schools.

Among the foremost of these is the Engineering Department of Vanderbilt University, Nashville, Tenn., which, though but recently established, already has sent out well-trained, energetic young men into positions of usefulness and responsibility in nearly every Southern State, and so well is this movement appreciated that the applications for young men to take positions during the past year have been so numerous that it has been almost impossible to retain the men until graduation. Every man in the senior class this year received important positions before the close of the session, and many of the undergraduates are filling positions of trust.

The technical instruction is of two kinds: Engineering instruction proper, and manual training.

From the heavy outlay necessary to establish and maintain well-equipped technological schools, tuition in them has hitherto always been expensive, and often beyond the reach of young men of moderate means. The munificence of the Vanderbilts—father and son—has, however, placed the cost of tuition at Vanderbilt so low as to present a barrier to no one; in fact, tuition is entirely free to any student in manual technology, and the class of road engineering is open, free of charge, to one properly qualified highway official or deputy from each county. These privileges are not restricted to State lines, but are limited only by the capacity of the institution, and should cause the Vanderbilt to be recognized as one of the strong agencies in the material development of the country, as it has ever been a leading power in intellectual culture.

Electric Railway Speed.

A RATE OF TWENTY-FIVE MILES AN HOUR IN DETROIT'S SUBURBS.

"Do you make any speed with the electric motor?" a reporter asked of Frank H. Fisher, inventor of the system in use on the Highland Park road.

"Come out and receive a practical demonstration," was the reply.

This invitation was accepted, and shortly afterward the young inventor and the reporter were at the power station. Here were found two dynamos, one for operating two cars and a large one for handling six. These dynamos were driven by one engine, and it was impossible to tell that the machines were delivering the current to the track, there being no spark and very little noise. The current is taken to the car by means of a third rail, which, in the city limits, is placed in a conduit entirely below the level of the street, but at the toll-gate it is raised somewhat, and protected by wooden stringers on the remainder of the road. The equipment of the road has been largely increased, and cars now run every half hour. While inspecting the conduit the car Ampere came dashing down the track. It had hardly stopped when the crowd of waiting passengers began to scramble for seats. Mr. Fisher and the reporter took a position on the front platform. The conductor gave the customary yell of "All aboard," and then a signal to the motor. The latter didn't yell "get up" and pound a tired horse with a whip. He simply moved a little switch and the car glided noiselessly and rapidly in the direction of Highland Park. The trip to the end of the road, which is three and one-half miles, was made in fifteen minutes. On reaching the switch the car Volta passed without any perceptible difference of speed in either. This explodes the erroneous idea that two cars going in opposite directions and propelled by electric currents cannot pass each other. On the return trip, when the pretty stretch of road from the post-office to Kaiser's was reached, Mr. Fisher gave the motor man a signal, who moved another switch and "let her out." The car shot forward and rushed past Highland Park and Capt. Stevens' farm at a rate of twenty-five miles per hour. The speed was maintained until the switch was reached, when it slowed down to twelve miles an hour into the city.

The new cars, Franklin and Faraday, recently placed on the road, show marked improvement in mechanical construction. The motors are placed on the front platform, entirely out of the way of passengers, and there is an entire absence of wires and other paraphernalia. Each car is provided with an ammeter, which indicates the amount of current being used by the motor. The cars themselves, which were built by the Pullman Company of Detroit, are fine specimens of railway architecture.—*Detroit Free Press.*

Too Old.

"Say! lemme use your telephone a minit?" he explained, as he rushed into an office on Griswold street.

"Certainly."

"Hello! hello! Give me 6205. Is that you, darling."

("Yes.")

"Say, pet, I left my wallet on the dresser with $250 in it. Did you find it?

("Yes.")

"Good! 'Fraid I'd lost it on the street. Big load off my mind. Shall I bring up those shoes?"

("Yes.")

"I'm dead broke, you know, but perhaps I can borrow $5 until after dinner, so as not to disappoint you. Good-by, darling."

("Good-by, sweetness.")

"Say," he said to the man at the desk, "perhaps you overheard what I said, and will lend me the five?"

The occupant pointed over his shoulder to the door.

"What? Skip?"

"Yes."

"Too old?"

"Yes."

"Been caught before?"

"Yes."

"I skip! Good-by!"

Notes Gathered around the Electric Club's Headquarters.

The club membership is now a round 300.

Among recent new members is Dr. L. Waldo, of Yale College.

The new club house will be ready by October 1st, it is now thought.

A liberal-hearted member, Mr. E. T. Copeland, gave the club a first-class engine.

Every branch of electrical science is represented in the membership of the club.

The initiation fee for resident members is now $20. Non-resident members are admitted free.

One of the most active and valuable non-resident members is Mr. C. J H. Woodbury, of Boston.

President H. C. Davis is an indefatigable worker, and spares neither time nor expense in forwarding the interests of the club.

The lithographed four per cent. bonds, amounting to $25,000, are now being issued to the subscribers as rapidly as called for.

The club house will be well lighted, the Edison, the Sawyer-Man, the United States and the Brush-Swan companies each donating an electric light plant.

Mr. E. T. Gilliland is giving the Board of Managers, of which he is one, the benefit of his extensive building and electrical knowledge, and is a most valuable member.

Mr. H. D. Lyman, former Assistant Postmaster-General, takes a strong interest in the Electric Club, and is one of the trustees on the new bonds just issued.

The regular monthly meeting will be held at the Hotel Dam, September 15th, at 6 00 P M. This will probably be the last meeting outside the new club house. Mr. Cheever will be the orator of the evening.

The first club member to be afflicted with that aristocratic ailment, the gout, was Vice-President J. B. Powell, and all the members regret to learn of his illness.

There is much demand for the first numbers of the papers issued by the club, as the new members quite generally are desirous of completing a file of the club's literature.

Hon. John Rooney finds time out of his very busy commercial and political life to attend the regular meetings of the club, and is a close listener to the scientific papers and discussion.

One of the active members, Dr. Otto Moses, sailed for Europe again last Saturday—two trips inside of as many months. The doctor intends to be back in time for the "opening" of the new house.

One of the club's members, who writes over the initials of "H. J. W. D," is receiving much praise for the very entertaining word pictures he is sending from the watering places to the N. Y. *Times.*

Although Col. Powell has resigned the general managership of the Brush-Swan Company, he will look after the placing of the electric plant of that company in the new house of the Electric Club.

Everything that can be done by electricity will be done, but as yet the cooking will be done in the usual way. If Dr. W. Leigh Burton will hurry up his electric cooking apparatus, the club will be glad to use it.

The Furniture Committee, consisting of H. C. Davis, J. N. Keller, E. T. Gilliland, John B. Powell and M. W. Goodyear, are just now wrestling with the furniture manufacturers. With this committee, it is safe to predict good bargains.

The secretary is endeavoring to collect the photographs of the officers and managers for framing and hanging in one of the parlors. The modesty he has discovered in this effort he reports as something remarkable, as he is yet a great many photos short.

Judge W. H. Kelley kindly put through the incorporation papers of the club. The liberal hearted judge is just now being congratulated over the very successful boat ride and dinner he gave to the east side poor last Saturday. Several thousands enjoyed his most practical hospitality.

Mr. Chas. W. Gould, of Wall street, is a popular member, and has been of much assistance in encouraging the proper growth of the club. If all the members should endeavor to equal his excellent record of four additional members, the objective point of 600 members would soon be realized.

Telephonic News

*** The Elmira (N. Y.) messenger service has united with the telephone company, and messages can now be called by telephone.

*** The Brooklyn Telephone Company moved into new offices last week, at No. 16 Smith street. In the Eastern District the office of the same company there will be removed during the week from the Germania Savings Bank Building, at Broadway and Boerum place, to a new building expressly erected on Boerum street, near Broadway.

*** The Metropolitan Telephone Company, New York, will first empty the Nassau street exchange into the new large exchange on Cortlandt street, and, as rapidly as possible, this will be followed by the exchanges of Murray street, New street, Pearl street and John street, bringing five exchanges all into one room, under one roof.

*** The Central New York Telephone Company has opened up telephonic communication between Syracuse and Auburn. Communication will be had with all the small towns between there and Auburn. A wire to Clyde will be in use in two weeks. That will probably give connection with Rochester direct. It is also expected that Syracuse will be able to talk with Buffalo.

*** On authority of President Bennett, of the Erie Telephone Company, it is announced that the differences between the American Bell and the Erie Telephone Companies have been satisfactorily adjusted, the American Bell granting the Erie Company a perpetual contract for its northwestern division, on the basis of a 30 per cent. interest in that section, and the American Bell Company waiving all participation in dividends until January 1, 1890, when the present contract expires.

The "Pulsion" Telephone.

It seems the telephone inventor is still alert and progressive. This time it is an acoustic telephone, and you don't need a receiver at all. Just have to wind the wire around a stump, or tie a knot in it half a mile away from the transmitter, and then listen at the stump or knot and hear the voice at the transmitter come out in great big, solid chunks. Here's the Associated Press agent's report from Milford, Mass., and he deserves to be let in on the ground floor in this surprising invention:

By invitation of W. A. Hayward, manager of the Pulsion Telephone Company, the Associated Press agent and other newspaper men inspected their private wire yesterday afternoon. The transmitter contains a most sensitive vibrator, fully covered by patents, [of course] and uses no electricity. Two transmitters were placed in the attics of two different buildings and connected by 1,900 feet of bare copper wire. Another was run to an apple orchard, wound around a tree and continued back to the house. The party stood in the orchard and Mr. Prince went to one of the attics. Conversation was carried on by simply standing near and talking toward the limb of the tree that the wire was attached to. The lowest whisper and the ticking of a watch were distinctly heard by placing one end of a broom handle or a stick against the tree and the other end to the ear. A hat was held against the wire and the Associated Press agent walked 60 feet by actual measurement from the hat and yet distinctly heard all the conversation. The playing of an harmonica and singing was heard a distance of 75 feet from the hat. The party then went to the attic of the house where one transmitter was stationed, while Mr. Prince remained at the other end, nearly half a mile a way. The lowest conversation was heard in any part of the house, also whispering, singing, etc. The party then went out of the house down stairs, and stood in the yard, three feet from the stairs, and heard Mr. Prince sing and talk. Mr. Prince then went down stairs in the house where his transmitter was located and talked in an entry away from the transmitter and wire, and could be plainly heard by the parties at the other end. Milford is thoroughly excited over the new invention.

The Auburn Electric Clock Company.

Innumerable systems have been devised for the detection and registry of negligence on the part of watchmen in their rounds of inspection of buildings which they have been employed to carefully guard, with various degrees of success.

The Auburn Watchmen's Register, illustrated in this issue, is the invention of W. L. Bundy, of Auburn, N. Y., to whom letters patent were issued March 1, 1887.

It was his aim to construct a register, which, though plain and simple in its mechanism, would embrace perfect accuracy in its workings. In applying that annihilator of time, electricity, to the operation of this register, it has been his intention to reduce the application of this force to a minimum, thereby reducing the liability of its impairment. In this register all stations are operated by only one set of magnets, thereby avoiding the use of the many electro-magnets and apparatus, as often found in other registers; thus the necessity of employing an expert electrician at great cost, in event of its getting out of repair, is obviated.

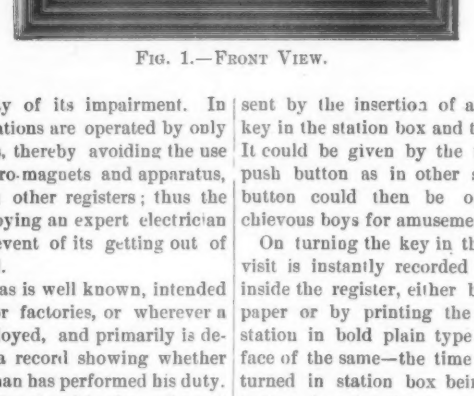


FIG. 1.—FRONT VIEW.

The register is, as is well known, intended for use in hotels or factories, or wherever a watchman is employed, and primarily is designed to furnish a record showing whether or not the watchman has performed his duty. A paper dial may be placed in the register at night, the door looked, and the manufacturer may leave his office conscious of the fact that in the morning he can at a glance tell whether his employe has been faithful and visited the various stations hourly, the order in which he made his rounds, and the time at which he was at each station. The watchman also cannot tamper with the clock without detection. If desired an attachment is furnished which will ring a bell in the superintendent's house or wherever desired, in case the watchman does not start on his rounds in 5, 10 or any desired number of minutes after the hour, so that if the watchman falls asleep or anything unusual happens to him, immediate notice is given and the matter can be immediately investigated. With all other "registers" at present known, no notice of neglect on the part of the watchman is given until morning, when the dial is inspected, and in the meantime the factory might be robbed or burned.

The fire alarm attachment can be operated either automatically or by the watchman, or both, thereby bringing the danger of destruction by fire to the least possible risk.

The superintendent's alarm, by which the superintendent or employer may be apprised at his own residence, at all times of the night, whether his watchman is faithful or derelict in performing his duties, is a superior feature.

The Auburn register when set up is enclosed in a polished case of hard wood.

The door is fastened by a Yale lock. The register is connected by a wire running to the different "station boxes;" a station box being placed at the different points in the building which it is desired that the watchman shall visit. The registering signal is sent by the insertion of a peculiar shaped key in the station box and turning it therein. It could be given by the use of a common push button as in other systems, but the button could then be operated by mischievous boys for amusement.

On turning the key in the station box the visit is instantly recorded on a paper dial inside the register, either by puncturing the paper or by printing the number of the station in bold plain type in ink upon the face of the same—the time that the key was turned in station box being also correctly indicated on the dial.

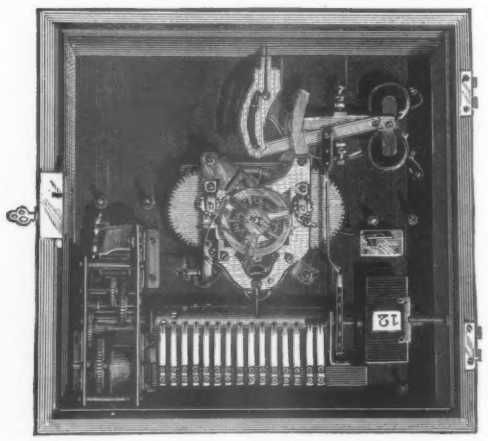


FIG. 2.—INTERIOR VIEW OF AUBURN WATCHMAN'S REGISTER.

A most valuable adjunct is the fire alarm attachment.

When the deplorable results caused by fires in hotels, and the terrible suffering and loss of life thereby occasioned, is remembered, it behooves the careful humane hotel proprietor to provide some reliable fire alarm, to give his guests and family timely warning of their danger, and at the same time summon the fire department. This register, when put up with fire alarm attachment, enables the watchman, if, while making his rounds, he discovers a fire about the premises, to give an alarm by simply turning his key in the station box which records the visit, and allowing it to remain ten seconds (or such time as adjusted for). It will then sound at the office, residence, the fire department, or such other place as you may desire, which will be at once understood as signal of serious trouble. Should such an alarm be given while the watchman is in the office, a glance at the clock shows him what room the trouble is in, the station from which the last signal is sent being always plainly indicated in large type, and he may go at once to the desired point. Meanwhile, the watchman at the scene of danger, having left the key in the box, without losing a second of time is doing what he can, single-handed, towards extinguishing the flames; and as soon as the ten seconds have expired, he is reinforced by all persons in the building. To prevent a fire from making any headway during the interval between stations, while the watchman is making his rounds, reliable thermostats are placed at the different stations, adjusted to such a degree of temperature as will insure their operation automatically.

In regard to the superintendent's alarm, if desired, a gong is placed in his residence, which is so arranged that it will ring automatically, in case the watchman does not start on his rounds, as directed, within five, ten, or any given number of minutes to which it may have been adjusted, thus keeping the superintendent constantly informed as to the actions of his watchman.

By the "tell tale" attachment these registers show whether the watchman has made his rounds in the way he was directed, and if he has made short cuts from station to station it is indisputably shown that he has done so.

The great source of annoyance to employers has ever been the ease with which unfaithful watchmen have been able to frustrate the different systems of detectors, or in other words, make the register or detector record the watchman's visits at the different stations for a whole night, in a few minutes' time, without actually making the visits. This is done in several ways; for example, procuring duplicate keys, thereby gaining access to the works of the register. Again, where the detector is operated by push buttons, the watchman will press the button holding the contact for a considerable period of time, and as the paper dial revolves, the punching needle remaining stationary, the result must necessarily be the mutilation and destruction of the dial, so that the employer has no record of the visits in the morning. This the watchman, on being questioned, will ascribe to the imperfect working of the detector. All of these annoyances the inventor has labored to overcome. If the watchman obtains the key to the Auburn Register, he is at once detected, because every time the door of the case is opened a notch is automatically cut in the outside edge of the paper dial at the very hour that he opens the door. To prevent mutilation of the dial by holding the key in the station box, the patented pivotal dial punch swings to one side as the pressure of the revolving dial is felt, allowing the same to pass by unharmed after recording the station. Again, if an attempt of this character should be made on a register which has the fire alarm attachment, by so doing he would ring the whole system of alarms as long as he held the contact, thereby exposing the fraud.

The Auburn Company also furnishes, if desired, the printing attachment in place of the punching needle, whereby the number of each station is printed upon the paper dial in clear cut type.

The points of superiority claimed by the Auburn Company are as follows:

First.—Its simplicity, durability and accuracy.

Second.—The small risk of its getting out of repair.

Third.—The reliability and distinctness of the record.

Fourth.—The impossibility to tamper with the dial.

Fifth.—Its reliable and efficient fire alarm attachment.

Sixth.—The superintendent's alarm.

Telegraph in China.

The Chinese Government officials have lines of wire from Shanghai to the north and south, well established and in good working order. With regard to the difficulty of telegraphing, as stated in the morning paper that published an interview with Capt. Brady, of Philadelphia, that is all nonsense. Since 1873 there has been a cable between Hong Kong and Shanghai. Other lines are in working order, and there has never been any difficulty experienced by the Chinese in sending messages. It requires about 7,000 characters to conduct the every-day ordinary transactions in Chinese mercantile affairs. A book containing these characters, numbered from one to 7,000, has been printed by the telegraph authorities, and if a man wants to send a message he simply wires numbers representing the characters, and the receiver marks down the number at his end of the line. Reference is made to the book, and the characters are ascertained. This system has been working for the past thirteen years and has given satisfaction to the Chinese.—*San Francisco Chronicle.*

An Electric Furnace Generator.

To the Editor of Electrical Review:

In view of the publication in your last number of Mr. Edison's scheme for utilizing the reaction of heat upon magnetism for the generation of electricity, your readers may be interested to learn that the labors of Mr. Edison are in substance anticipated by more than two years, by an application for a patent, filed by Mr. Emile Berliner, the well-known electrician.

Believing Mr. Berliner to be entitled to the authorship of the pyro-magneto electric generator, and knowing that he is far in advance of anything hitherto published upon this subject, I, as Mr. Berliner's attorney, asked his permission to publish the text of his application in the ELECTRICAL REVIEW. He readily consented, and I herewith transmit an exact copy of his application, with the request that you may be so kind as to give the same to the public through the medium of your esteemed paper.

You will notice that the numerous suggestions of modifications which appear in the specification contain the germs of valuable improvements upon the original apparatus; and those who know the untiring productiveness of Mr. Berliner will at once understand that these germs were not allowed to die for want of nourishment.

His original ideas Mr. Berliner freely communicated to other electricians at an early period; he invited them to join in his work; but they declined, and, in one remarkable instance, at least, upon the ground that the invention was completed, and that there was no room left for the elaboration of the original idea.

In an historical review of the genesis of an invention, it is proper to notice every step; it is for this reason but just to call attention to the descriptions of pyro-magnetic motors described in the "Journal of the Franklin Institute" for January, 1879, p. 39; and in "Science" for March 7, 1884, Vol. III., No. 57, p. 274. While the idea of converting pyro-magnetic variations into electricity is foreign to these publications, they evidently emphasize the feasibility of translating the same into motion. Subsequent inventors are indebted to the authors of those motors for the material basis of their inceptions; and Mr. Edison, who is noted for his fairness in matters of this kind, evidently overlooked these old facts in his laudable ardor for publishing to the world what he believed to be new.

An invention rarely issues fully armed and equipped from the brain of a single inventor; a Pallas Athena is not born every day, and it cannot detract from Mr. Edison's well-earned fame, if he has to share the credit for the invention of the pyro-magneto electric generator with others.

Very respectfully,

JOSEPH LYONS.

WASHINGTON, D. C., Aug. 29, 1887.

MR. BERLINER'S ELECTRIC FURNACE GENERATOR.—FILED JUNE 18, 1885.

(Copied from the Records of the United States Patent Office.)

SPECIFICATION.

To all whom it may concern: Be it known that I, Emile Berliner, citizen of the United States of America, residing at Washington, in the county of Washington, and District of Columbia, have invented certain new and useful improvements in electric furnace generators, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention has for its purpose the production of electricity by the assistance of heat; and it is based on the following principles:

Iron, when heated to bright red, is not affected by magnetism, and, in turn, does not react upon that force; but if cooled down to a dull red heat, it instantly regains the ability to absorb or engage magnetism. Furthermore, if a magnet is capable of holding suspended a mass of iron, *i. e.*, an iron armature weighing (not more than), say, twenty pounds, it will also be capable of holding suspended on it a mass of brass, or other non-magnetic material, weighing, say fifteen pounds, by means of an iron armature weighing only a fraction of an ounce.

This shows that, in order to engage, say, three-quarters of the attractive capacity of a magnet, a very small portion of the equivalent weight of iron is required to do this. It is also well known that the greater the amount of displacement of the magnetic field in a magneto-electric generator, the greater a current is produced in the conductor of said generator.

If, now, I take a magnet and provide it with a coil around its pole or poles, and place before this magnet, and in proximity to the coil, a piece of iron, heated to bright red, nothing will occur to disturb the magnetic field; but the instant the iron cools down to a dull red, the magnetism becomes excited, and a momentary current of electricity is produced in the coil.

I may go a step further, and have a series of such magnet coils and iron armatures, and by connecting the coils into the same circuit, and cooling the armatures in rotation, one after the other, a number of electrical impulses will be produced, which, when they follow one another rapidly, will approximate a continuous electric current.

These being the underlying principles of my invention, which, of course, is capable of being worked out into different devices for the accomplishment of the same purpose, I will confine myself in this specification to a simple apparatus, capable of demonstrating the underlying principles heretofore stated.

In the drawing, *A* is a magnet, having a tubular hole, *C*, through its center. *B* is a coil of insulated wire, the insulating material being fire-proof, like asbestos, cement or other fire-proof substance. *D* is a brick furnace, provided with a fire-box, *H*, and chimney, *S*. *K* is a plate or disk of iron, set inside a brass ring, *M*, which, in turn, is so imbedded in the upper part of the furnace that the flames cannot strike above it, but will heat it only from below. The terminals of the coil, which are *E* and *F*, are closed through the galvanometer, or other electrical apparatus, *G*. A tube, *T*, is inserted into the top of the magnet, and is provided with and connected to a pair of bellows, *M*.

In order to produce electricity a fire is started in the box *H*; the heat on its way to the chimney must then impinge against the iron armature *K*, which, under the heat's continuous influence, will soon be rendered bright red, when it will have lost its power to engage the magnet *A*.

If now the bellows be compressed, a current of cooler air will be forced through tubes *T* and *C* against the plate or disk *K*, and out through the vent holes *V*. As soon, however, as the air strikes the plate *K* it will cool it sufficiently to reduce the bright red to a dull red and instantly the magnetic influence will be re-established, and a corresponding change in the magnetic field will be accompanied by an electric impulse in the coil *B*. If now the current of cooled air be discontinued or averted the plate will again resume the bright red, and a current in the opposite direction, but of less intensity, will occur in the coil *B*.

It is evident that a working up and down of the bellows at a slow enough rate will alternately change the bright red to a dull red and the reverse, and the consequence will be a series of electrical impulses in the coil *B*, which may then operate the electrical apparatus *C*.

It will be observed, since the depression of the bellows requires comparatively little force, that the principal acting force is the heat, which suspends the magnetic influence between the magnet and armature, while a little draft of compressed cooler air re-establishes this influence suddenly. The current thereby produced might be utilized to charge another coil surrounding the magnet, and re-enforce the magnetic field, and in that case the magnet might be substituted by a tubular core of iron; the bellows might be dispensed with, and a constant source of compressed air might be employed, regulated by suitable mechanism to supply the air puffs to be directed against armature *K*, or even pieces of cold metal might be made to approach the armature at intervals and cool it by contact with the same, or by absorption and radiation; or a series of coils and magnets might be placed toward one larger armature disk forming a common armature, heated by one furnace.

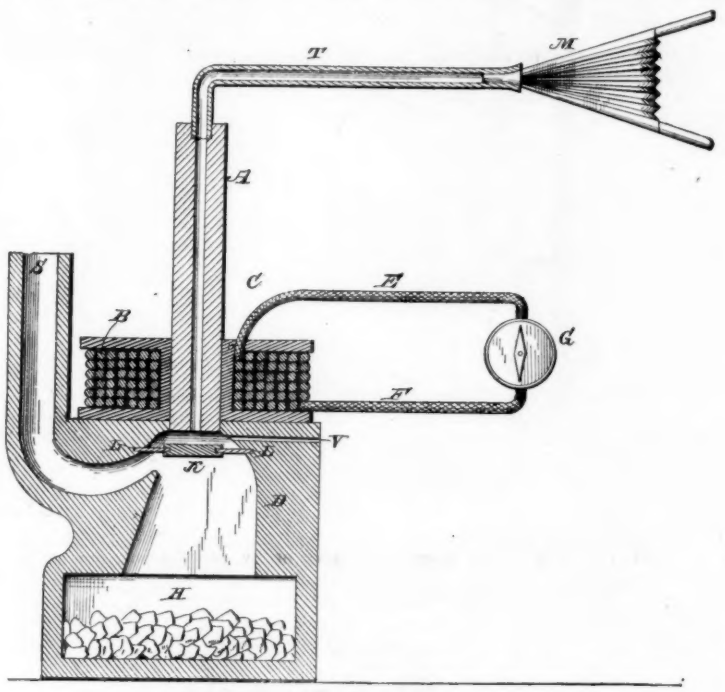
All these ideas can be brought to bear on the subject whenever time offers itself to experiment, which is the most effective modus. For the present I claim:

The combination with the magnetic field and a conductor situated therein, of a piece of iron which is alternately heated and cooled, thereby producing electricity substantially as described.

In testimony whereof, I have affixed my signature in the presence of two witnesses.

EMILE BERLINER.

CHARLES W. HANDY, MYER COHEN. } Witnesses.



SECTIONAL DRAWING OF EMILE BERLINER'S ELECTRIC FURNACE GENERATOR.

Telephone Books Wanted.

To the Editor of Electrical Review:

Will you please publish in your paper the titles of a few instructive books on telephones, suitable for a young INSPECTOR.

Wilkes Barre, Pa., Aug. 31, 1887.

ANSWER.—Lockwood's "Practical Information for Telephonists." Price, $1 00.

TELEGRAPHIC

.... The new telegraph line between New York and Albany is being rapidly constructed.

.... In the Order of Railroad Telegraphers there are 13,600 members out of the 30,000 operators of the United States.

.... A young telegraph operator on the Chesapeake and Ohio Railroad fell asleep, and the result of his negligence was a collision and $75,000 loss.

.... The life of a telegraph operator is no always a happy one. Recently Operator W. S. Smith, of New York, found his wife and a Baltimore friend drinking porter together, and objected so strongly that a struggle ensued, and now a separation will probably follow.

.... The question of permits to run wires in the city since the Board of Electrical Control assumed full power is sometimes a vexed one. Recently Commissioner Hess stopped some Western Union workmen because the necessary permit was not forthcoming, much to the astonishment of the workmen. The company claims the work was being done under a former permit.

.... In reference to the report in the Cincinnati papers that a syndicate had been formed, composed of Mackay, Mills, Garrett and others to consolidate all telegraph lines in opposition to the Western Union, Vice-President De Castro, of the Postal Telegraph Company, says: "It is a very nice idea, but there is not a word of truth in it. Mackay had no conference with President Garrett or any of the gentlemen mentioned, and I am positive that such a consolidation has not been seriously considered."

Unpleasant Result from an Undelivered Telegram.

A novel suit has been filed in Judge Reed's court in Topeka, Kan., and will come up for hearing July 20. The case is instituted by sixteen young ladies, who sue the Western Union Telegraph Company for $300 damages each. The complaint states that owing to the failure on the part of the company to deliver a message which was to have been sent from Valley Falls to Nortonville, in February last, the young ladies were compelled to walk eight miles to reach the village of Perdue, where they were to give an entertainment for the benefit of their church. They were lost, and wandered around over the prairie from 6 o'clock in the evening until 2 o'clock the next morning.

An Electrical Stratagem.

When the electric telegraph was first introduced into Chili a stratagem was resorted to in order to guard the posts and wires against damage on the part of the Araucanian Indians and maintain the connection between the strongholds on the frontier. There were at the time between forty and fifty captive Indians in the Chilian camp. General Pinto called them together, and, pointing to the telegraph wires, he said: "Do you see those wires?" "Yes, General." "Very good; I want you to remember not to go near nor touch them, for if you do your hands will be held, and you will be unable to get away." The Indians smiled incredulously. Then the General made them each in succession take hold of the wires at both ends of an electric battery in full operation. After which he exclaimed: "I command you to let go the wire!" "I can't; my hands are benumbed," said the Indian. The battery was then stopped, and the man released. Not long afterwards the General restored them to liberty, giving them strict injunctions to keep the secret, and not to betray it to their countrymen on any account. This had the desired effect, for, as might be expected, the experiment was related "in the strictest confidence" to every man of the tribe, and the telegraph has ever since remained unmolested.

ELECTRICAL AND SCIENTIFIC

* * The Mt. Olive Incline Company, Pittsburgh, strongly favor converting the short line from Carson to the station into an electric road.

* * Contracts have been made for an electric railway, three miles long, at Lakeside, O., using two cars, and overhead conductors. It will be a summer road.

* * The Natchez (Miss.) Cotton Mills Company has contracted to put in an electric plant of the U. S. Electric Light Company's system; 250 lights will be used.

* * It is stated that the Eastern Telegraph Company's new cable from Land's End to Gibraltar and Malta, is in so forward a state that it will be ready for work within the next two months.

* * A number of Washington gentlemen were the guests of Wm. Wharton & Co., Philadelphia, last week, looking into the workings of the electric car which is being run by storage batteries in that city. They expressed themselves as highly pleased. Prof. A. Reckenzaun, of London, is in Philadelphia, personally superintending the work.

* * A storage battery has appeared in Detroit, known as the Woodward. Dr. Lancelot Younghusband seems to be the father—at least the husband—of the storage battery venture. The other members of the Woodward syndicate are Robert McKinstry, C. H. Thompson, E. C. Brown, Geo. S. Terry, Charles A. Warren, J. M. Farland, Thomas Williamson, James Ronald, Frank B. Preston, William Foxen, Frank B. Trout, E. M. Washburn, N. T. Thurber. Capital, $1,000,000.

* * The London *Electrician* says that it has recently been discovered by M. de Rufz that notwithstanding the excellent insulating properties of vulcanized fiber when dry, yet after long soaking in "a liquid" (whether pure water or not does not appear) it swells considerably and becomes very sensibly porous, so much so as to be admirably adapted for use in two-fluid primary batteries, or in secondary cells of the Faure type as a separator between the plates. For each of these purposes it is said to be well adapted, because of its very low electrical resistance. We may, however, remark that the apparent resistance of a porous pot is in reality the resistance of the liquid which it contains in its interstices, and therefore varies with the nature of the liquid in which it has been soaked. Hence the measurement of the apparent resistance of a porous pot is an index of the rate at which liquids can diffuse through its walls, so that for primary batteries there will in some cases be a limit below which it is not advantageous to reduce the resistance of the cell. On the other hand, for secondary batteries, and also for primaries used in electric lighting, where the liquids are presumably exhausted before much diffusion can have taken place, the new material seems to give promise of usefulness. At the Ecole de Physique it was found that the internal resistance of a Bunsen cell, which measured .06 ohm, with an earthenware pot, was reduced to rather less than 0.03 ohm on the substitution of a vulcanized fiber cell ½ mm. in thickness. One advantage cells of this description would undeniably possess, that is, in the reduction of weight, and M. de Rufz attaches considerable importance to this point as facilitating the employment of primary cells for the propulsion of tricycles, balloons, and boats. It is, however, necessary to add this caution; vulcanized fiber dissolves rapidly in the solutions of certain salts, amongst which are the bichromates of potassium and of sodium, and it is also attacked by concentrated sulphuric acid, although in the dilute acid it remains unaffected.

The Waterhouse Dynamo.

Since illustrating the Waterhouse system of electric lighting some time since, noticeable mechanical improvements have been adopted, and we publish on this page a cut of the dynamos as they are now being made. These dynamos run very smooth and free from sparking. No mechanism is required for moving the brushes in regulating.

The Waterhouse method of regulation is new, and is such a departure from well-known methods that electricians have doubted that the theory was possible; and in several instances, before the Waterhouse Company could make the sale, they have had to prove their claims, and we are informed have always been successful in so doing.

In a gas engine test, in cutting out lights, the Waterhouse dynamo showed a corresponding deduction in the power being used; as each light was turned off the amount of gas consumed was reduced. In cutting out lights and running the machine in short circuit, or with one light burning (which is a better test in regulation than to run in short circuit), the dynamos run perfectly cool, no current, or just enough to operate the one light, being produced. The machine, it is claimed, can be run any length of time in that condition.

The reliability of the Waterhouse regulator justifies the company in presenting the dynamos not only for purposes of electric lighting, but also for the running of motors and the charging of storage batteries where a steady standard current is required.

The mechanical improvement in the dynamo is the increased size of the stands and the addition of the pan upon which the machine rests, by means of which the saturation of the floor by oil from the machine is prevented, and it has two adjusting screws and nuts on the side for moving the dynamo, and thereby tightening the belts.

The Waterhouse system has made a good record in its first season, and begins the second year with every encouragement for an extensive business.

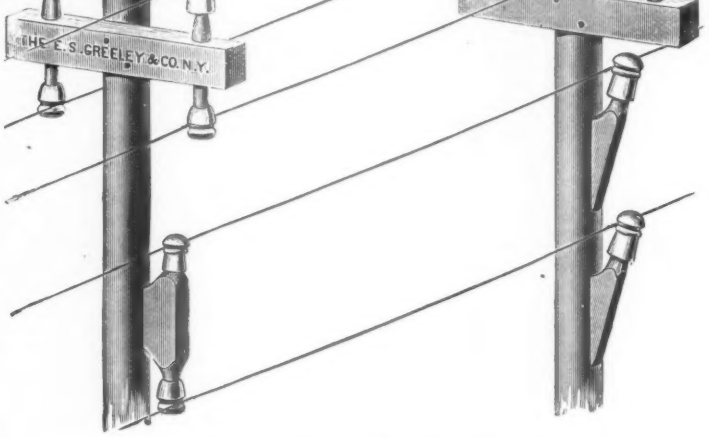
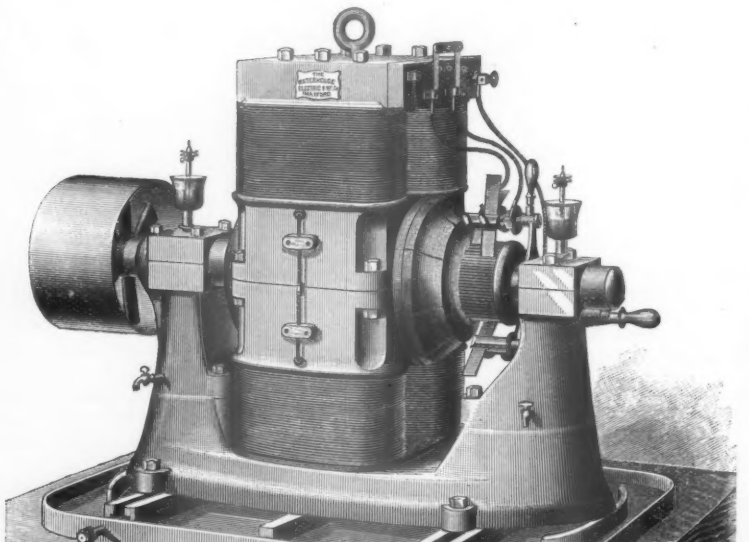


FIG. 2.—NEW AND OLD METHODS COMPARED.

FIG. 1.—BROWN DUPLEX PIN AND INSULATOR.



THE NEW WATERHOUSE DYNAMO.

—— The machinery in the Mather Electric Light Company's new factory at Manchester, Conn., is nearly all up, and work will commence at once.

A New Duplex Pin Insulator.

Mr. R. G. Brown, of New York, has designed a new duplex pin and bracket, illustrated on this page, which the The E. S. Greeley & Co. are manufacturing.

In the drawings Fig. 1 is an oak pin made longer than usual, so as to project some inches through the cross-arm. A thread is cut on both ends, so that an ordinary pony or other glass insulator can be screwed on the top, and a new glass insulator of Mr. Brown's design screwed on the lower end, as is clearly shown. The lower insulator has an opening which extends centrally through it from top to bottom. The wall of this opening is screw-threaded throughout its length. When this insulator is screwed upon the downwardly projecting pin, which is to sustain it upon the cross-arm, any moisture, as from rain, which may fall upon the rounded or convex top, will readily flow off, and in event of any moisture finding entrance into the opening about the pin, its tendency will be to pass downward and flow out or escape through the bottom of the opening. Fig. 2 is an illustration of a six-wire line, such as is often seen in the country. One pole shows the present system of cross-arms, pins and brackets, and the remaining pole shows the new system as intended by Mr. Brown. The wires on both poles are held at exactly the same distance apart, and the under insulator and its wire are some inches away from the cross-arm. Consequently the objections pointed out as existing in the present system, whereby the wires are liable to become crossed and the defective insulation caused by insects, nests, etc., are impossible under the new plan.

The new system is specially adapted to the building of telephone lines, both for pole and housetop work.

As there are but one half the number of cross-arms, pins, and bolts required, the cost in construction is less and the line presents a lighter, neater and less objectionable appearance in the eyes of the public.

New York Electric Light Contracts Let.

The Gas Commission, consisting of the Mayor, Comptroller and Commissioner of Public Works, last Friday awarded the following electric light contracts:

To the United States Illuminating Company—Washington Park, 15 lights at 24 cents; and Cortlandt, Liberty, Barclay, and Whitehall streets, and Chambers street from Broadway to East River, 38 lights at 40 cents.

To the Brush Electric Illuminating Company—Avenue A, from Fourteenth street to Twenty-fourth street; First avenue, from Fourteenth to Fifty-ninth street; Grand street, from Broadway to Sullivan street and Union and Madison Squares 91 lights at 25 cents; also Irving place, from Fourteenth street to Twentieth street; Fourth avenue, from Fourteenth street to Seventeenth street, and Eighth street, from Third avenue to East River 23 lights at 40 cents.

To the East River Electric Light Company—Park row, the Bowery, Third avenue to Eighty-sixth street; Grand street, from Broadway to East River; Sixth avenue, from Carmine street to Fifty-ninth street; Eighth avenue, from Fourteenth street to Fifty-ninth street; Broadway, from Canal street to Fourteenth street, 244 lights at 19 3/10 cents; also Tenth avenue, from Fourteenth street to Fifty ninth street; Center street, from Grand street to the Bridge; Desbrosses street, from West street to Canal street; Christopher street, from Sixth avenue to West street; Houston street, from river to river; Tenth street, from Second avenue to East River; Eighth street, from Sixth avenue to Cooper Union; Fourth avenue, from Bowery to Fourteenth street; First avenue and Avenues B and D, from Houston to Fourteenth street; West Broadway and South Fifth avenue; Stuyvesant street, from Eighth street to Tenth street; 191 lights at 39 cents.

To the Mount Morris Electric Light Company—Greenwich street, from Battery place to Warren street, 15 lights at 40 cents.

To the Harlem Lighting Company—One Hundred and Twenty-fifth street, from river to river; Eighth avenue, from One Hundred and Twenty-first street to One Hundred and Fifty-fifth street; Third avenue, from Eighty-sixth street to One Hundred and Thirtieth street, 116 lights at 24 cents; Mount Morris Park, 12 lights at 50 cents, and Harlem Bridge (Third avenue) 7 lights at 60 cents.

To the American Electric Manufacturing Company—Sixth avenue, from One Hundred and Tenth street to One Hundred and Thirty-sixth street; One Hundred and Tenth street, from Boulevard to St. Nicholas avenue; Boulevard, from One Hundred and Tenth street to One Hundred and Fifty-fifth street; total, 93 lights at 32 cents; also Third avenue, from the Bridge to Willis avenue, and One Hundred and Thirty-eighth street, from Third avenue to Madison avenue bridge; total, 26 lights, at 40 cents.

All other bids were rejected.

Edison's New Patent on Multiple Arc Distribution.

The following is a synopsis of the invention described in Edison's patent, No. 369,280, issued August 30, 1887 (application filed Feb. 5, 1880). The object of this invention is to arrange a system for the generation, supply and consumption, for either light or power, or both, of electricity, that all the operations connected therewith requiring special care, attention, or knowledge of the art shall be performed for many consumers at central stations, leaving the consumers only the work of turning off or on the supply, as may be desired—in other words, to so contrive means and methods that electricity may be supplied for consumption in a manner analogous to the systems for the supply of gas and water without requiring any greater care or technical knowledge on the part of the consumer than does the use of gas or water, in order that economy, reliability, and safety may be insured.

In carrying the invention into effect, a city, town, village, or locality may form one district, or, if the extent of territory makes it desirable, may be divided into several districts. In each district a central station is provided, at which are grouped a suitable prime motor or several motors, dependent upon the amount to be supplied, generators or means for converting the prime motive force into electricity, and means for determining and regulating the amount of electricity generated and supplied, in order that a constant pressure of electricity may be kept up. The prime motors are any suitable engines, steam or water, and one or a series of two or more is provided, as may be necessary, each of which is provided with its own system of shafting and belting, driving a number of magneto-electric machines, the number actuated by one prime motor being termed a "battery."

In the illustrations, Fig. 1, is a plan view of a central station. Fig. 2 is a plan view illustrating the street mains and house connections with translating devices properly introduced.

In Fig. 1 three batteries of generation C C' C^2 are shown, which number may be increased or diminished as circumstances may demand. One generator c of each battery is used to generate the current feeding the field-of-force magnets of the other machines in its battery, the circuit from such field generator through the field-of-force coils in each battery being shown by the broken lines 2 2 2. For actuating the rotating parts an engine D is used with each battery, connected by belt d to line of shafting E, from which belts e pass to the generator. The coils of each battery in which currents are generated are connected, as in C and C^2, in multiple arc to conductors 3 3 3 3, which in turn are connected in multiple arc to the main conductors 6 6, from which lead in multiple arc the street conductors or mains 7 7, or, as shown in part of battery C, each machine may be directly connected in multiple arc to the station conductors 6 6. F is the prime field-of-force generator, supplying the battery field-of-force generators c c c, its circuit being shown in broken lines 1 1. The field-of force magnets of F are magnetized by a current from the galvanic battery G, in whose circuit is arranged the series of conductors H, provided with the cut-out K, by which more or less of the resistances are put in or out of the circuit feeding the field of F. The current generated by F being dependent upon the intensity of the magnetization of its field-of-force magnets, which in turn depends upon the current transmitted around the magnets by the battery G, as the resistance varies such current, it follows that by varying the resistance in the circuit of G the current generated by F varies, which in turn varies the current generated in c c c, which in turn varies the current generated in the supply machines of the batteries, proportionate increase of current and rise of pressure in the latter following increase of current around the magnets of F, and *vice versa*. One or more test lamps T L are placed at the central station in derived circuits to serve as a photometric test of the pressure in the lines. For more accurately indicating variations in the pressure, one or more electrometers, galvanometers, or electro-dynamometers E D are placed in derived circuits with a scale mark indicating the pressure determined on as the standard pressure to be maintained. By the proper use of these indicating devices and the regulating devices described, a uniform pressure may be readily and easily maintained through all the mains. It is preferable to connect all circuits from the generating machines to the main conductors 6 6 through switches I I I, so that an entire battery or any portion thereof may be thrown in or out of circuit as the draft upon the station may indicate. It is to be noted, also, that the belt and pulleys of each machine are to be arranged by any of the well-known plans, that it may be disconnected from the motor when desired. These means may be used, when desired, as means of regulation, the number of machines in operation being controlled thereby, while the effective force of each machine while in operation is controlled by the resistances. The engines may be of any desired pattern or power, the number of machines in any one battery being limited by the power of the engine.

In Fig. 2 the mains 7 7 are shown, leading from corresponding wires at central station (see Fig. 1) down each side of the street. At side streets conductors 12 12 branch off. The small circles o in this figure indicate electric lamps. For street lighting they are placed, as shown, in derived circuits from the street mains. From the mains derived circuits 9 9 lead into houses, in which are placed at some suitable spot the meters M, through which one of the house conductors

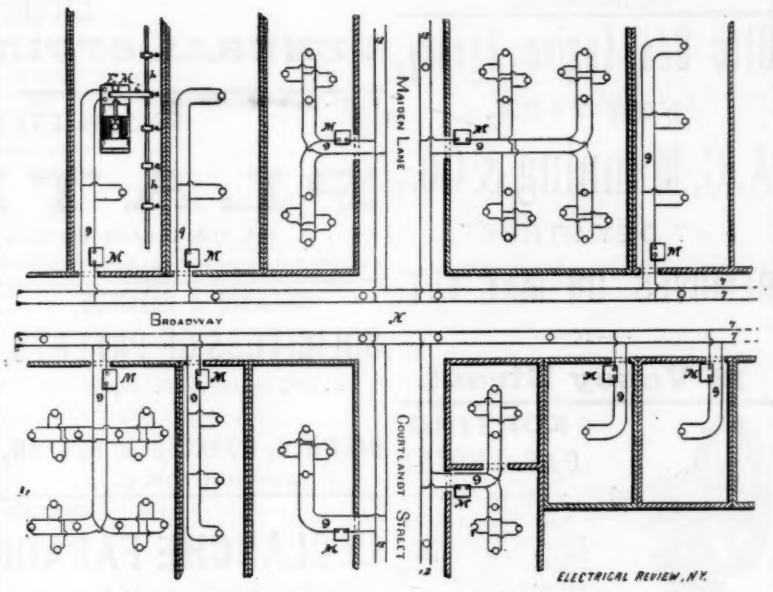


Fig. 2.—Same, Showing Street Mains and House Connections.

passes, and by which the amount of electricity supplied to the house is accurately determined. Upon these house circuits are arranged lamps on the multiple arc system in such number, position, and grouping as may be desired. In these circuits can also be introduced electromotors E M, for furnishing light motive power. From the motor a belt i leads to a line of shafting h, and pulleys a a for any needed distribution of the power; or the belt i may pass directly to a sewing or other machine, a separate motor being used

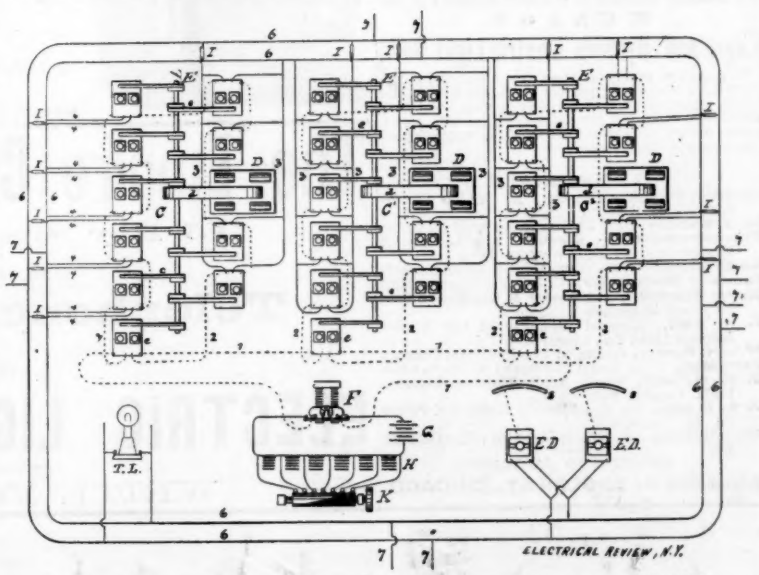


Fig. 1.—Plan of Central Station of Edison Patent of August 30, 1887.

for each power-driven machine. Where motors are desired, each, preferably, should be made of a power proportional to the maximum work to be done. While the electrical tension in each machine is regulated at the central station, yet if the maximum load or work be diminished at any particular motor, its speed would necessarily be increased. It also might be desired at times to diminish the normal speed of the motor. In order, therefore, that some determinate speed may be maintained, irrespective of load or work, each motor should be furnished with a governor.

Among the more important claims are these:

1. In a system of electrical distribution, the combination, with a complete or round metallic circuit, of a number of generators connected in multiple arc with such circuit, and consisting each of an armature revolving in a magnetic field, and a number of translating devices, also connected in multiple arc with said circuit, substantially as set forth.

4. In a system of electrical distribution, the combination, with a complete or round metallic circuit, of a number of generators connected in multiple arc with such circuit, and consisting each of an armature revolving in a magnetic field, a number of translating devices, also connected in multiple arc with said circuit, and a regulator for regulating the supply of current to such circuit, substantially as set forth.

5. In a system of electrical distribution, the combination, with a complete or round metallic circuit, of means for generating electricity connected with such circuit, and consisting of one or more dynamo or magneto-electric machines, translating devices connected in multiple arc with said circuit, an indicator of the electric pressure upon such circuit, and a regulator under control of the operator for regulating the supply of current to such circuit, substantially as set forth.

6. In a system of electrical distribution, the combination, with a complete or round metallic circuit, of a number of generators connected in multiple arc with such circuit, and consisting each of an armature revolving in a magnetic field, translating devices connected in multiple arc with said circuit, an indicator of the electric pressure upon such circuit, and a regulator under control of the operator for regulating the supply of current to shch circuit, substantially as set forth.

7. In a system for the generation and distribution of electricity for light or power, through cities or towns or districts thereof, a central station whereat are combined a number of generators of electricity connected in multiple arc, and consisting each of an armature revolving in a magnetic field, an indicator of the electric pressure, and a regulator of the current generated, conductors forming complete or round metallic circuits leading from such station, to distribute the current throughout the system, and translating devices connected in multiple arc with such conductors.

Electric Light News

—— Four companies are bidding for the electric light contract at Flushing, L. I. Competition is the life of trade.

—— The New Albany Electric Light and Power Company, New Albany, Ind., expect to put in a $40,000 electric lighting plant.

—— Messrs. Armington & Sims, the renowned engine builders, have sent out a beautiful colored picture, which will be given a place of honor wherever received.

—— The New Haven Electric Light Company, New Haven, has recently ordered a 90 horse power Armington & Sims Company engine from the Jarvis Engineering Company, Boston. This makes the tenth engine of this make ordered.

—— The Shelbyville Water Works Company is another water works company which has decided to go into the electric light business and combine it with their water works. A contract was given last week by the City Government for lighting the streets by the American system of electric lighting.

—— The Chicago Arc Light and Power Company, after a considerable amount of investigation, have decided to put into their new consolidated station two 500 horse power Williams compound engines. When this station is in full and complete running order, there will be few equals and no superiors to it in point of perfection, convenience or capacity.

—— Last week the Oswego Gas Company, of Oswego, N. Y., decided upon going into the electric light business, and gave the American Company a contract for 50 lights. The Seattle Gas Company, of Seattle, W. T., which has been using the American system for the past six months, has decided to largely increase its plant, and bave just ordered another 50 light plant from the American Company.

—— The projected lighting of the Royal Museums of Berlin by electricity has been vetoed by the Prussian Minister of Public Instruction, who thinks that the public has ample facilities for visiting the museums in daytime. Only the Museum for Art Industry, which already possesses the necessary appliances, will be lighted by electricity and be accessible to the public in the evening hours.

—— A new incandescent electric lamp has, it is said, been devised by the electrician of the Julien Power Storage Company at Brussels. The filament is made of a new material, and gives a discharge of electricity in the hydrogen-filled bulb which produces an aureole of light. It is claimed that the illuminating power is one-third greater than in the Edison lamp for the same expenditure of energy.

—— The Taylor Manufacturing Company, the engine builders of Chambersburg, Pa., have just issued an attractive catalogue of their high speed automatic cut-off engines, manufactured under the patents of R. M. Beck. The catalogue is handsomely illustrated, contains several tables giving dimensions, powers and speeds of these engines as adapted for electric lighting. The cover presents in artistic form a view of an electric light plant, connected to one of the Taylor Company's engines.

—— In looking over the plans for the new mechanical and physical laboratory at the Polytechnic Institute, Worcester, Mass., the trustees have concluded that a second building will be necessary for conducting electrical experiments demanding delicacy of treatment and constancy of physical conditions, and accordingly a small building will be erected on the little depression of land just below the stone building and the grove. The dimensions will be 15 by 20 feet, and the building will have but one story and one room. All disturbance from machinery and other causes will here be avoided. The plans for the buildings are at a standstill, awaiting the return of the trustees from vacation.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING AUG 30, 1887.

368,858 and 368,859 Printing telegraph; Robert J. Sheehy, New York, N. Y.

368,907 Fire alarm telegraphic repeater; Charles Burgher, Boston, Mass., assignor to the Automatic Fire Alarm and Extinguisher Company, New York, N. Y.

368,931 System of synchronism for telegraphy; Gilbert A. Cassagnes, Paris, France.

368,948 Electro-magnetic dental mallet and plugger; Philip Helmer, Clinton, Iowa.

368,955 Mast-arm for hanging electric street lamps; Francis H. Lacey, Atchison, Kan.

368,987 Conductor tip; Schuyler S. Wheeler, New York, N. Y., assignor to the C. & C. Electric Motor Company, same place.

369,034 Galvanic battery; John A. Seely, New York, N. Y.

369,036 Lightning arrester; Elmer A. Sperry, Chicago, Ill.

369,091 Manufacture of incandescent electric lamp filaments; Alexander Bernstein, London, England.

369,121 Method of making impervious the joints of the lead pipe of electric cables; 369,122, Test circuit for telephone cables: William R. Patterson, Chicago, Ill., assignor to the Western Electric Company, same place.

369,194 Electric arc lamp; Osborn P. Loomis, Somerville, Mass.

369,219 Electric generator: Leonidas G. Woolley, Grand Rapids, Mich.

369,238 Joint for telegraphic wires; David P. Emminger, Philadelphia, Pa.

369,256 Electric speaking telephone; Morris Martin, Malden, Mass., assignor to the American Bell Telephone Company.

369,259 Insulating telegraph cables; William R. Patterson, Chicago, Ill., assignor to the Western Electric Company, same place.

369,267 Process of treating filaments for incandescent electric lights; Edward P. Thompson, Elizabeth, N. J.

369,280 System of electrical distribution; Thos. A. Edison, Menlo Park, N. J., assignor, by mesne assignments, to the Edison Electric Light Company, New York.

PATENTS.

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BUSINESS NOTICE.

"In making the statements which follow we can verify each and all of them as facts. Mr. Edward P. Thompson, of Temple Court [7 Beekman St.,] New York, is a good man to bring your patent cases to, for he is thoroughly versed in all the ins and outs of a Patent Attorney's duties. The following are some of his qualifications: Graduate of Stevens Institute as Mechanical Engineer. For four years tutor of classes of young men in mathematics and experimental physics at Elizabeth, N. J. Served professionally as Electrician and Chemist in the Swan Electric Company of New York for two years. Because of past successes as a Patent Attorney at 13 Park Row, New York, was appointed, to succeed N. S. Keith, of the patent agency of the *Electrical World* and Associate Editor. N. S. Keith is known as the Translator and Reviser of Schellen's Treatise on "Dynamo Electric Machinery." Mr. Thompson for two years personally prepared and prosecuted all the patent business of *Electrical World's* Patent Agency, and is the author of a series of articles in said paper upon "Analytical and Systematic Method of Inventing," which were widely known and favorably received. Mr. Thompson is a member of American Institute of Electrical Engineers and American Society of Mechanical Engineers. He is author of the "Expansion of Polynomials," which the ablest mathematicians of the world universally commend."
—*New York Observer.*

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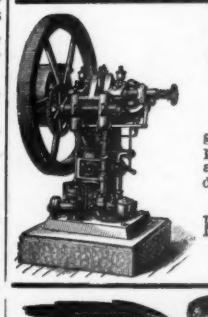

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